

One piece at a time: solving the Florida Bay puzzle

What is Florida Bay? What is it like today? What was it like in the past? What will it be like in the future, after the Comprehensive Everglades Restoration Plan has been implemented? As part of restoring south Florida, scientists continue to investigate Florida Bay in an effort to answer these questions and piece together the Florida Bay puzzle.

What is Florida Bay? This shallow, triangular, estuarine lagoon sits between the Everglades and the Florida Keys. It covers 850 square miles (2,200 square kilometers) and contains about 200 small islands. Although the bay looks like one body of water, it actually behaves like three or four basins. For example, shallow banks restrict exchange from the nearshore basins to the central basin causing them to operate somewhat independently. The bay also supports a significant proportion of the Keys' economy by providing an excellent place for fishing, diving and boating.

What is Florida Bay like today? Many people would say it is suffering. Between 1987 and 1991, those who lived and worked around the bay saw or heard about rising salinity, loss of seagrass, increased plankton blooms, and reduced water clarity. Such changes had never been recorded before. As scientists and managers tried to sort out what was happening, they found little scientific information that could help them. As a result, a scientific program to study Florida Bay was launched in 1994. This program was followed in 2000, by the Comprehensive Everglades Restoration Plan, which was created to guide restoration in the Everglades. Along with about 200 other restoration efforts, these two programs will set up the future of the Everglades and Florida Bay.

What was Florida Bay like in the past? Improving our ability to manage Florida Bay in the future involves looking into its past. Scientists use sediment cores, annual growth bands in corals, distributions of the hard parts of marine animals, and other tools to unravel the history of the bay. They've discovered that the bay has not always been what people remember from the last 50–100 years. For example, the bay's salinity has always varied, with rainfall being the major driver. Rainfall varies with large-scale climatic cycles, like the El Niño Southern Oscillation. Plankton blooms have also been a part of the bay's history, with significant blooms occurring in the mid-1700s. During this time, the Little Ice Age probably led to increased rainfall and runoff from the mainland. Then and today, nutrients carried into the bay by runoff acted as fertilizer for plankton blooms. Distributions of animals in sediment cores suggest that seagrass was less common up to about 50 years ago. Analyses also identify signals from our activities. Chemicals in sediment cores imply that agriculture and development have raised nutrient levels in the nearshore parts of the bay, which may drive plankton blooms in these basins. In addition, sediment cores and annual growth bands in corals show signals associated with major human activities that took place in the 1900s. Analyses point to both increased salinity resulting from diversion of freshwater to avoid floods and decreased exchange with the Atlantic Ocean due to the construction of the Flagler railroad.

What will Florida Bay be like in the future? Implementation of the Comprehensive Everglades Restoration Plan will influence Florida Bay. The plan will restore water flow through the Everglades to a more natural state. The increased flow will end up in Florida Bay. As in the past, the overall condition of the bay will still be affected primarily by rainfall, but conditions in nearshore basins may change. Increased freshwater flow will lower salinities, and we may see changes in the distribution of seagrasses and other plants and animals that cannot adjust. One key to the success of the Comprehensive Everglades Restoration Plan will be ensuring that the increased flow of freshwater to Florida Bay does not bring with it an increase in nutrients to fuel plankton blooms and contaminants to

cause other undesirable changes. Those responsible for implementing the plan will work toward a healthy Florida Bay by using performance measures and adaptive management to adjust how the plan is applied.

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